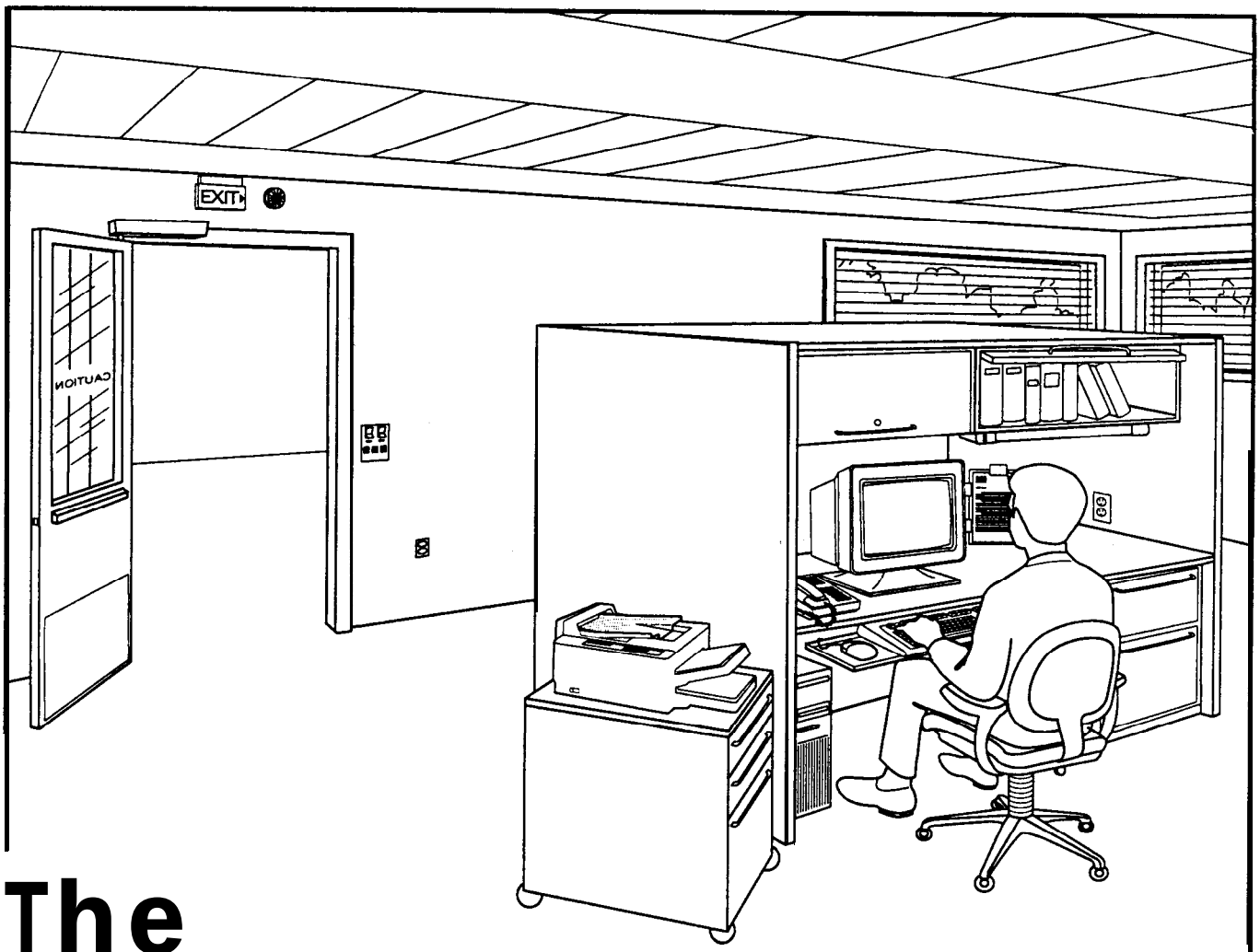

The Workplace Ergonomics Workbook

An illustrated guide to assessing ergonomic needs in the office workplace and planning effective solutions

The Workplace Ergonomics Workbook
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What is Ergonomics?

Ergonomics is the field of study that seeks to fit the job to the person, rather than the person to the job. This process is achieved by the evaluation and design of workplaces, environments, job tasks, equipment, and processes in relationship to human capabilities and interactions in the workplace.

Designing office workstations to fit workers makes common sense, but is not common. Many workstations include poorly designed seating and other components. Even "ergonomic" products don't always live up to the term.

Interest in office ergonomics has grown with the rapid rise in musculoskeletal workplace disabilities, especially back and upper extremity conditions. Collectively, these disabilities cost billions of dollars and thousands of lost work days every year.

Ironically, office automation to minimize worker effort has resulted in more sedentary and repetitive tasks, contributing to the rise in these disabilities. Controlling the risk of these injuries requires more than "ergonomic" furniture and other physical workplace features. Job design is just as important, as are the work practices of the employees themselves.

Ergonomics and Universal Design

Universal design means design for people of all ages and abilities, including those with functional limitations due to age, disability, or circumstance. An employee hurrying to meet a deadline may make the same errors as an individual with a chronic cognitive limitation. An employee with armloads of materials may prefer a door lever over a door knob, just as an employee with arthritis might. When moving equipment, everyone prefers ramps to stairs, just as wheelchair users do.

Everyone, with or without a disability, benefits from design that includes the widest possible range of abilities. This is especially true in the workplace, where universal design is essential to accommodating as well as preventing disability.

Millions of workers suffer occupational injuries every year. Many don't go back to work, costing taxpayers billions of dollars in disability benefits and lost productivity. Reasonable job accommodations are enormously effective in helping employees with disabilities return to work. At the same time, many of these job accommodations are also appreciated by their coworkers.

Adjustability in seating and work stations is a good example. A worker who suffers a back injury may benefit from a well-designed work chair, just as a coworker at risk of the same injury might, and the work surface adjustable to the worker's height minimizes stooping and bending.

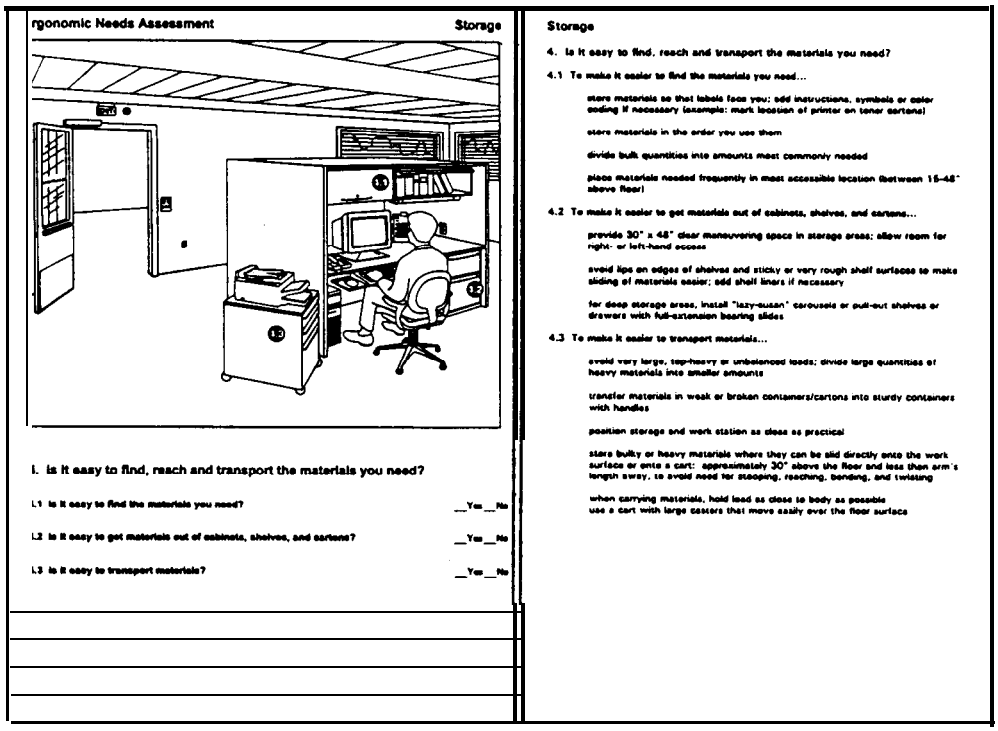
This Workbook provides guidance to the ergonomics of each feature of the office workplace, from the office interior to the furniture and equipment inside and the work practices of employees themselves.

This Workbook is based on the principle of universal design and its potential for accommodating as well as preventing many workplace disabilities.

How to Use This Guide

This Workbook is intended for use by employees and supervisors in assessing the fit between the employee and his/her workplace. By using the 1 O-point Preliminary Checklist on the facing page, employees and their supervisors can determine whether a thorough needs assessment, provided on pages 6-24, is required.

This Workbook provides detailed information about further identifying and planning solutions for ergonomic needs indicated by "NO" answers to any of the 10 points of the Checklist. For each of the 10 points, a workplace illustration is provided with numbered bullets corresponding to 3 or 4 additional questions to help in assessing the need. To the right of this illustration page is a list of suggestions and recommendations for meeting the ergonomic need identified.



rgonomic Needs Assessment — Storage

I. Is it easy to find, reach and transport the materials you need?

I.1 Is it easy to find the materials you need? __Yes __No

I.2 Is it easy to get materials out of cabinets, shelves, and cartons? __Yes __No

I.3 Is it easy to transport materials? __Yes __No

Storage

4. Is it easy to find, reach and transport the materials you need?

4.1 To make it easier to find the materials you need...

store materials so that labels face you; add instructions, symbols or color coding if necessary (example: mark location of printer on toner cartons)

store materials in the order you use them

divide bulk quantities into amounts most commonly needed

place materials needed frequently in most accessible location (between 15-48" above floor)

4.2 To make it easier to get materials out of cabinets, shelves, and cartons...

provide 30" x 48" clear maneuvering space in storage areas; allow room for right- or left-hand access

avoid lips on edges of shelves and sticky or very rough shelf surfaces to make sliding of materials easier; add shelf liners if necessary

for deep storage areas, install "lazy-susan" carousels or pull-out shelves or drawers with full-extension bearing slides

4.3 To make it easier to transport materials...

avoid very large, top-heavy or unbalanced loads; divide large quantities of heavy materials into smaller amounts

transfer materials in weak or broken containers/cartons into sturdy containers with handles

position storage and work station as close as practical

store bulky or heavy materials where they can be slid directly onto the work surface or onto a cart; approximately 30" above the floor and less than arm's length away, to avoid need for stooping, reaching, bending, and twisting

when carrying materials, hold load as close to body as possible
use a cart with large casters that move easily over the floor surface

Employees and supervisors can use this information to plan the most effection solution to ergonomic workplace needs. This information can also be used to work with procurement, building engineering and other technical staff in resolving needs in the most cost-effective way.

The goal of this Workbook is to identify and resolve these ergonomic needs to minimize the risk of injury to employees, as well as to accommodate the needs of those employees who work with disabilities.

Ergonomic Needs Assessment **Preliminary Checklist**

1. Can you enter/exit the building and reach your workstation without help?

If not, refer to the additional questions and recommendations on pp. 6-7

2. Is all visual and auditory information clear and easy to understand?

If not, refer to the additional questions and recommendations on pp. 8-9

3. Is the lighting adequate for your work tasks?

If not, refer to the additional questions and recommendations on pp. IO-I 1

4. Is it easy to find, reach and transport the materials you need?

If not, refer to the additional questions and recommendations on pp. 12-I 3

5. Are you comfortable in your work chair?

If not, refer to the additional questions and recommendations on pp. 14-I 5

6. Is your work space adequate for you and your work tasks?

If not, refer to the additional questions and recommendations on pp. 16-I 7

7. Is your computer display easy to use?

If not, refer to the additional questions and recommendations on pp. 18-I 9

8. Are you comfortable using your keyboard and mouse?

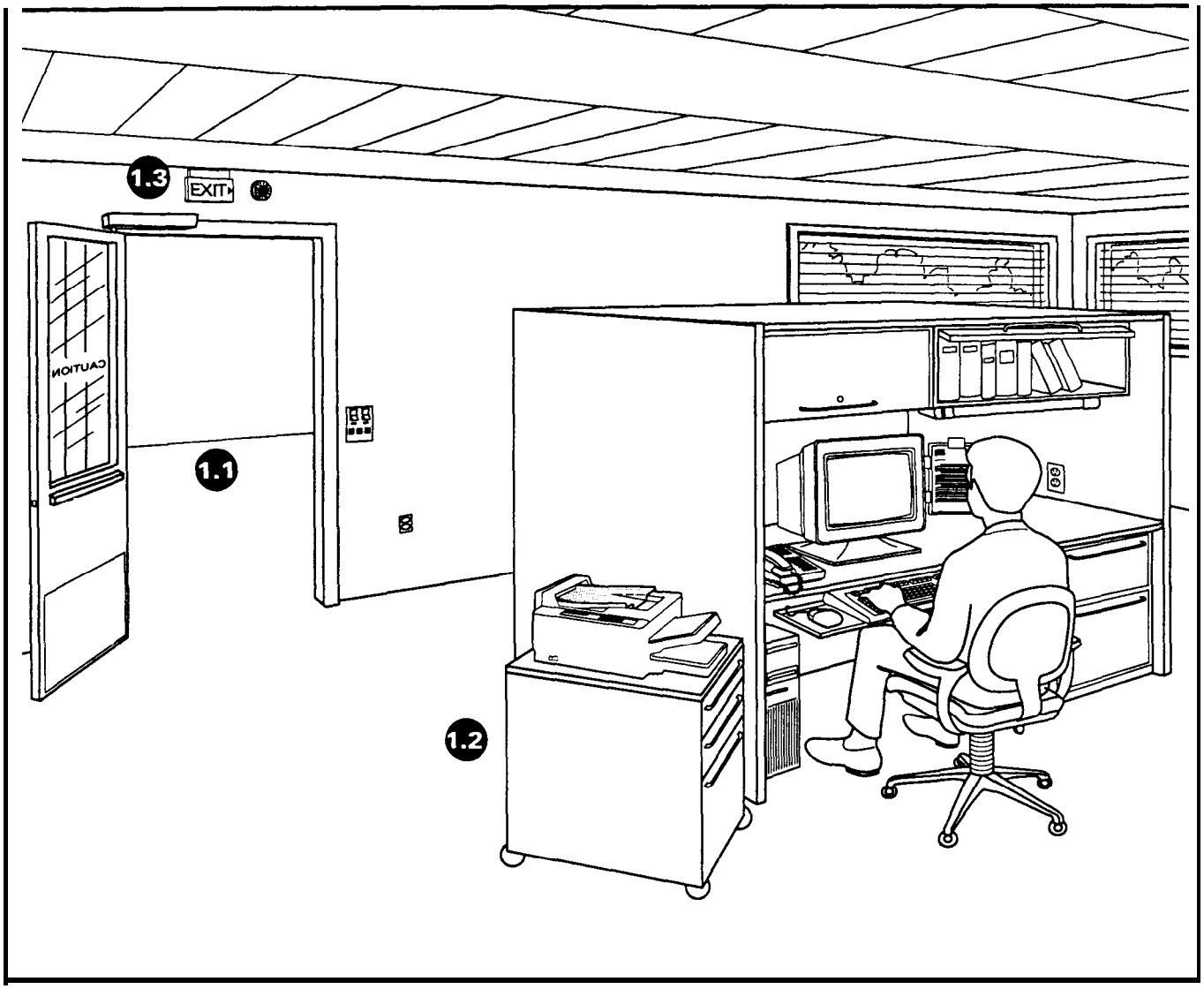
If not, refer to the additional questions and recommendations on pp. 20-21

9. Can you use your telephone and other office equipment comfortably?

If not, refer to the additional questions and recommendations on pp. **22-23**

IO. Are you free of excessive fatigue and pain at the end of your work shift?

If not, refer to the additional questions and recommendations on pp. 24-25



1. Can you enter and exit the building and reach your work station without help?

1.1 Are the entrances and exits easy to locate and use? ___Yes___No

1.2 Is it easy to get to the work area and move around freely and safely? - Yes No

1.3 Is it easy to evacuate the building safely? - Yes No

Work Station Accessibility

1. Can you enter and exit the building and reach your work station without help?

1.1 To make entrances and exits easier to locate and use...

place auditory and visual alarms at wheelchair-accessible routes and mark with International Accessibility Symbol

provide at least 32" clearance at doorways (be sure to consider thickness of the door); bevel or add a ramp to any threshold greater than 1/4"

provide 60" clear floor space inside and outside of doors and 18" to the latch side; between sets of doors, allow at least 48", plus the width of the doors

contrast doors with surrounding walls in color and brightness; provide view through upper half of door (use tempered glass with decals at face height); install kick-plates 12-l 8" above floor

replace door knobs with levers, push-bars, or U-shaped pull handles 36-48" above floor

minimize door closer resistance or install powered door openers; lock or increase closer resistance on doors to hazardous areas

1.2 To make it easier to reach the work area and move around freely and safely.;.

minimize distances between entrance, work area, restrooms, office equipment, other common facilities; relocate if feasible

clear a path of travel to the work area at least 36" wide; remove objects hanging lower than 80" above the floor or protruding more than 4" from walls

provide ramps with slip-resistant surfaces and handrails as an alternative to steps; mark level changes with flush contrasting visual and tactile floor strips

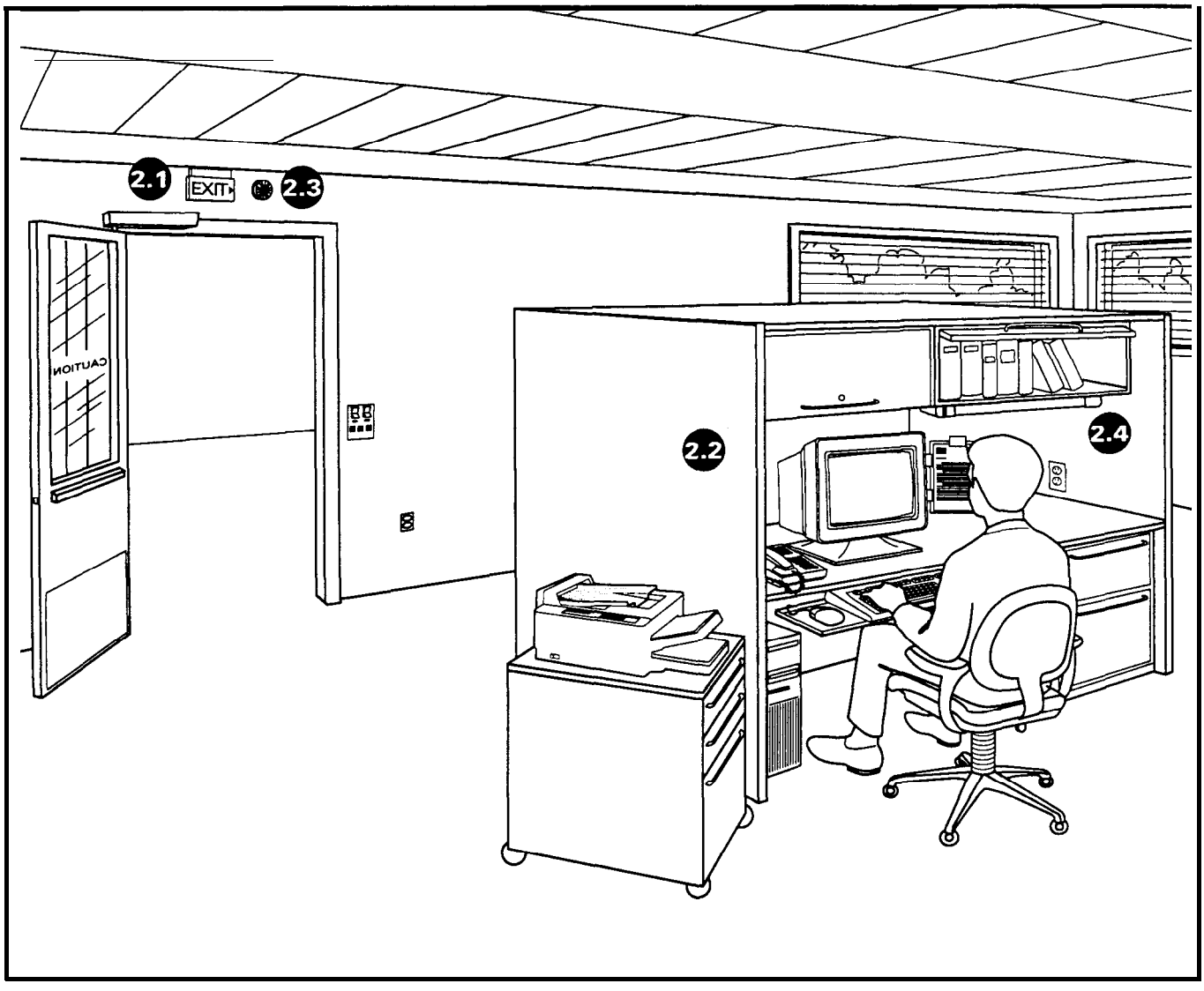
carpeting should be non-absorbent in warm, dark color without padding or sculptured textures

1.3 To make it easier to evacuate the building safely...

contrast walls with floors in color and brightness

place plants, wall hangings, and other "landmarks" to aid direction-finding

develop and rehearse evacuation drills; establish buddy system for any disabled workers; inform internal security and local fire/rescue staff of special assistance needed



2. Is all visual and auditory information clear and easy to understand?

2.1 Can see and hear important information from anywhere in your work area? ___Yes ___No

2.2 Can you see important information in very bright or very dim light? ___Yes ___No

2.3 Can you hear important information above the noise? ___Yes ___No

2.4 Is your work area quiet enough for conversations and telephone use? ___Yes ___No

Visual and Auditory Information

2. Is all visual and auditory information clear and easy to understand?

2.1 To make vital information seen and heard throughout the work area...

locate visual information according to its importance - direct line of **sight from workstation to emergency signs, less important** signs away from center of vision

ensure adequate lighting on all visual information; lighting should strike signs at an angle of about 45 degrees

wherever possible, communicate information through sight, sound, and touch (example: vibrating pager with visual display

2.2 **To make visual information understandable in very bright or very dim light...**

use matte, non-glare surfaces on signs; clearly contrast color, brightness, and texture of lettering with background

use sharp San-serif typestyle with clear distinction between similar shapes (0 and 0, **A** and 4, 1 and I, I and l); for large bodies of text, use serif typestyle, such as **Times Roman**

use caps and lower case, except for tactile signs, which should be all UPPER CASE, 5/8" - 2" high, with e x t e n d e d letter spacing and accompanied by Braille

for numbers, use arabic (1,2,3,4) rather than Roman (I, II, III, IV) numerals

tactile lettering should be located 60" above floor; raised 1/32" where dirt may fill recessed lettering, recessed where raised lettering might cause confusing shadows on raised lettering.

avoid underlining and borders around lettering, and avoid tight spacing between letters, words, and lines

reinforce text messages with familiar symbols wherever possible

2.3 To make auditory information heard above noise.. .

avoid very high or very low tones

if work area is noisy, amplify loudness to exceed usual noise level

minimize or isolate noise from air conditioning and other equipment with isolation mounts or enclosures; locate copiers, printers, etc. in sound-proof area near work station

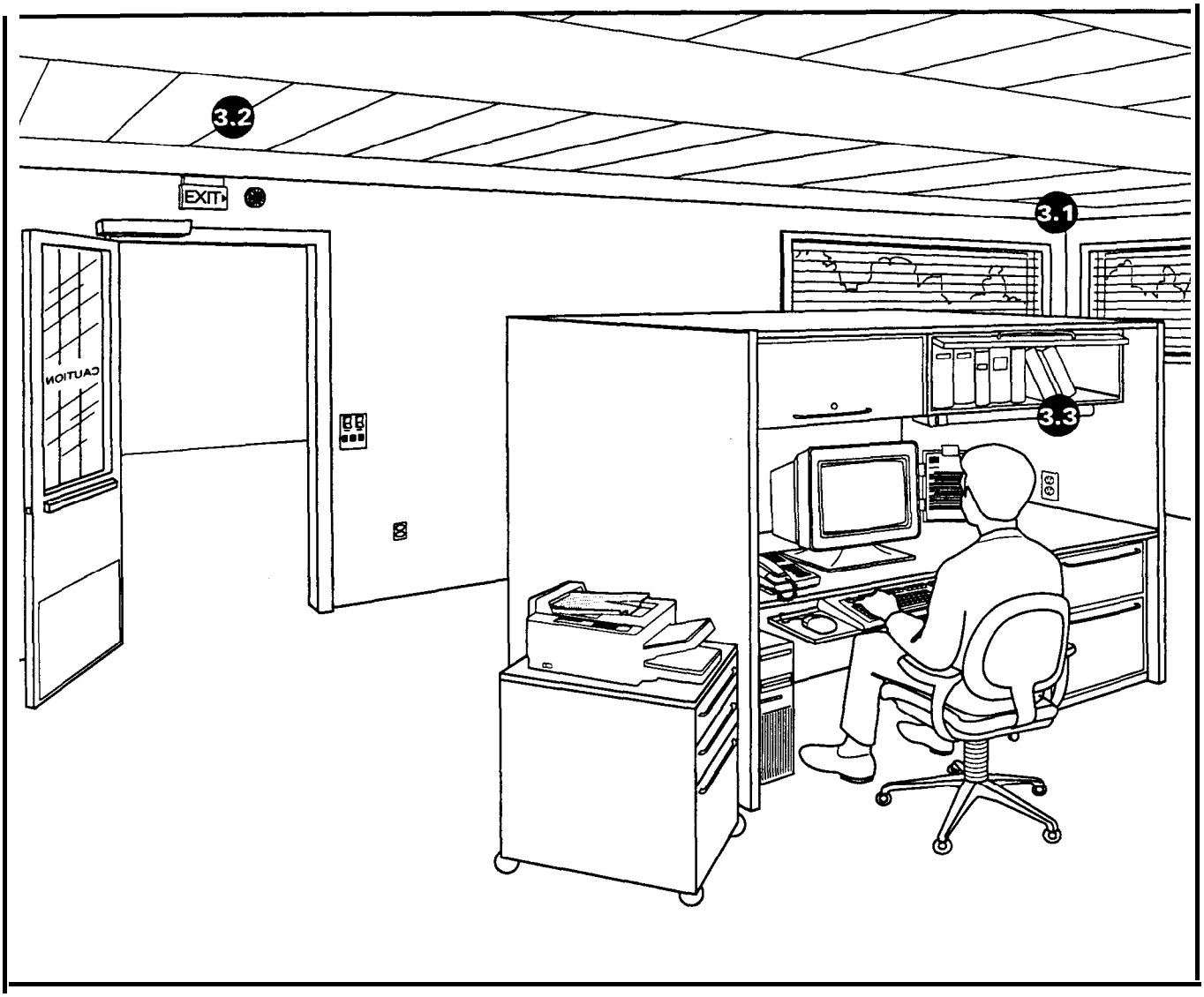
reinforce auditory information with visual signals

2.4 T o make the work area quiet enough for conversations and telephone use...

use sound-absorbing ceiling tile, wall coverings, and carpeting to minimize reflected sound

install sound absorbing panels at work stations to minimize distractions or provide privacy: 29-41" for modesty screens, 41-69" for seated privacy, 70-73" for standing visual and acoustical privacy

add volume control or headset to telephone, use e-mail, or set aside "quiet area" for meetings



3. Is the lighting adequate for your work tasks?

3.1 Can you work without noticing glare from windows and lights? ___Yes __No

3.2 Can you control the general room lighting? Yes ___No

3.3 Is there "task" lighting at your work station? Yes ___No

Lighting

3. Is the lighting adequate for your work tasks?

3.1 To eliminate sources of glare...

place blinds or curtains on all windows in our direct line of sight, or use room dividers to deflect glare

orient your work station perpendicular to windows so that light sources and reflections are out of your field of vision

reduce glare from bright walls with "eggshell" paint or wall covering

cover polished work surfaces with pads or blotters

use non-glare glass on artwork

add a non-glare screen overlay on your computer monitor

3.2 To control the room lighting...

reduce overall lighting level (to about 20 footcandles*) to minimize glare and deep shadows

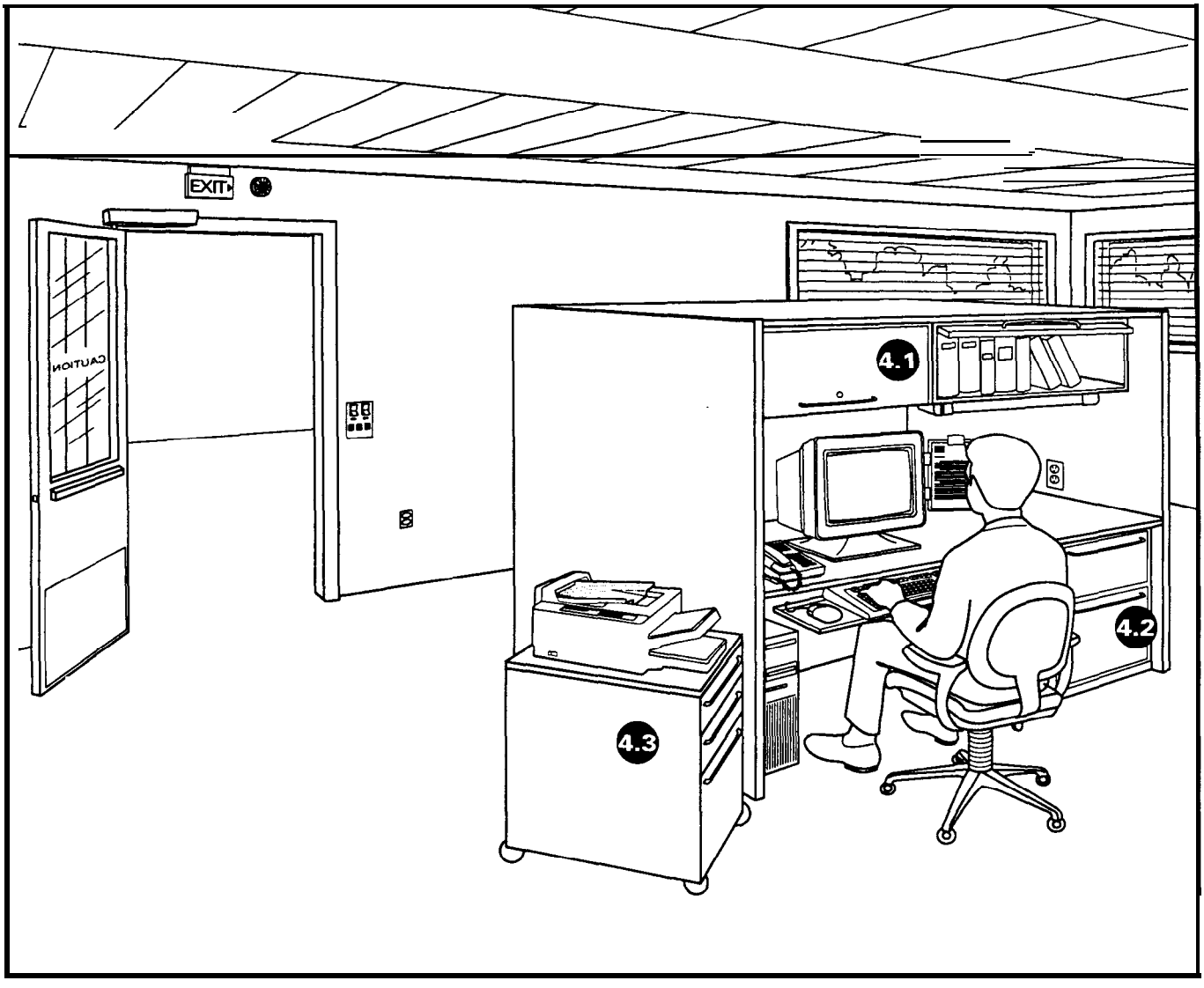
install pure white bulbs/tubes for accurate color perception

3.3 To add "task" lighting at your work station...

provide task lighting adjustable for intensity and angle (about 30-70 footcandles' for reading/writing)

increase the lighting level on liquid-crystal displays (LCD's)

*** A footcandle is a measure of illumination equal to the light provided by a single candle at a distance of one foot away.**



4. Is it easy to find, reach and transport the materials you need?

4.1 Is it easy to find the materials you need? Yes No

4.2 Is it easy to get materials out of cabinets, shelves, and cartons? Yes No

4.3 Is it easy to transport materials? Yes No

Storage

4. Is it easy to find, reach and transport the materials you need?

4.1 To make it easier to find the materials you need...

store materials so that labels face you; add instructions, symbols or color coding if necessary (example: mark location of printer on toner cartons)

store materials in the order you use them

divide bulk quantities into amounts most commonly needed

place materials needed frequently in most accessible location (between 15-48" above floor)

4.2 To make it easier to get materials out of cabinets, shelves, and cartons...

provide 30" x 48" clear maneuvering space in storage areas; allow room for right- or left-hand access

avoid lips on edges of shelves and sticky or very rough shelf surfaces to make sliding of materials easier; add shelf liners if necessary

for deep storage areas, install "lazy-susan" carousels or pull-out shelves or drawers with full-extension bearing slides

4.3 To make it easier to transport materials...

avoid very large, top-heavy or unbalanced loads: divide large quantities of heavy materials into smaller amounts

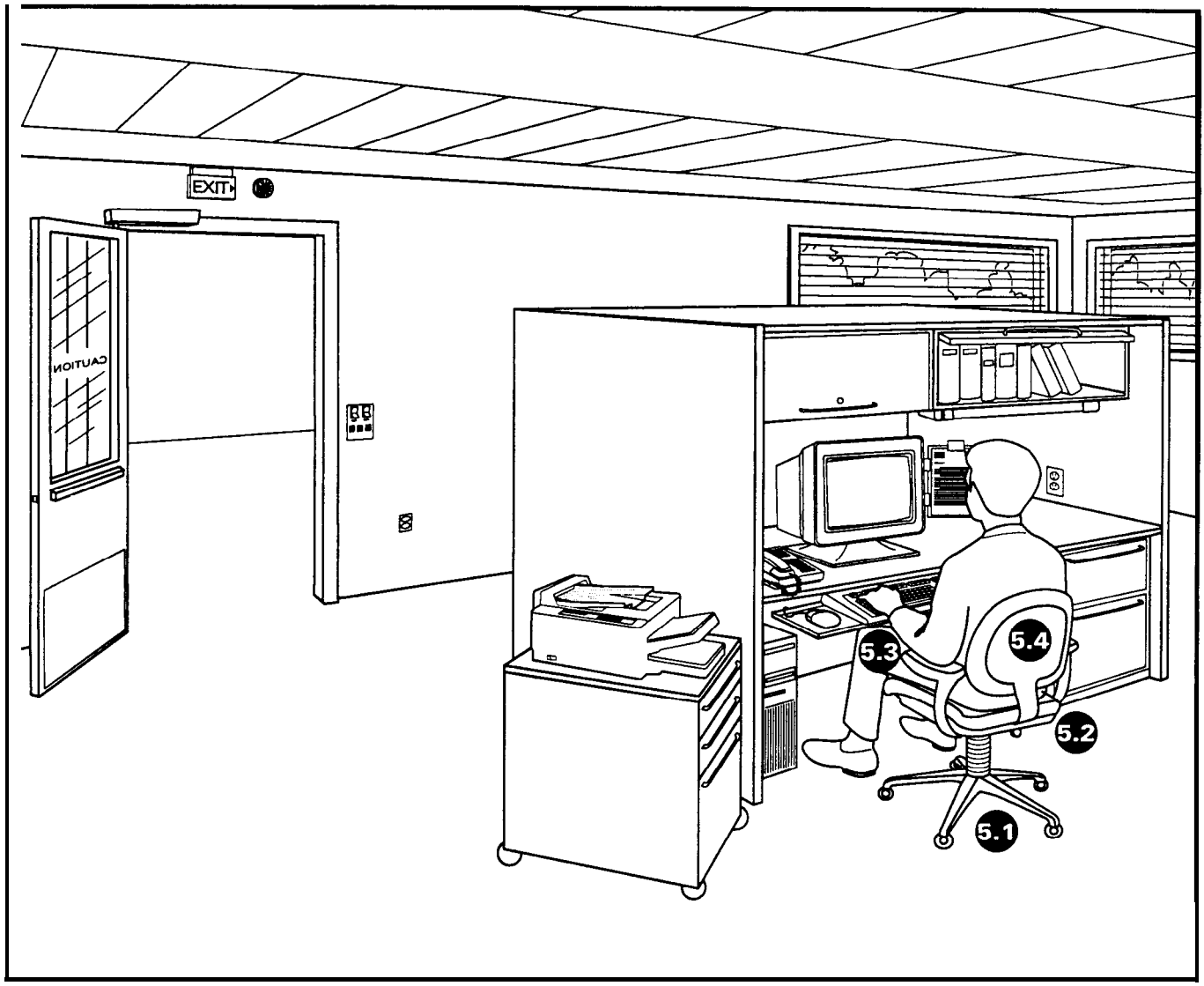
transfer materials in weak or broken containers/cartons into sturdy containers with handles

position storage and work station as close as practical

store bulky or heavy materials where they can be slid directly onto the work surface or onto a cart: approximately 30" above the floor and less than arm's length away, to avoid need for stooping, reaching, bending, and twisting

when carrying materials, hold load as close to body as possible

use a cart with large casters that move easily over the floor surface



5. Are you comfortable in your work chair?

5.1 Does your chair feel stable and secure? **__Yes__No**

5.2 Is the seat the right size for you? **__Yes__No**

5.3 Are your arms supported in a comfortable position? **_ Yes _No**

5.4 Does the backrest provide good support for your back? **_ Yes _nb**

Seating

5. Are you comfortable in your work chair?

5.1 To make your chair stable and secure...

use a chair with 5-caster base and full 360 degree swivel, casters that roll freely over the floor surface

use a chair you can adjust easily with one hand while seated; if not, take the time needed to make adjustments as needed to vary posture, and get help if needed

use a chair with firmly-padded seat and breathable, medium-texture upholstery, not slippery or coarse

adjust the seat height (approximately 16-20 1/2" above the floor) so that your thighs are horizontal and your feet are flat on the floor; if necessary, use a footrest

5.2 To make sure the seat is the right size for you (about 18" wide by 15-17" deep)...

with your back against the backrest, make sure your thighs are fully supported, without pressure on the back of your knees; the front edge of the seat should be well rounded

make sure that clearance (18-22") between the armrests allows you to get into the chair easily, while supporting your arms close to your body

5.3 To make sure your arms are supported in a comfortable position...

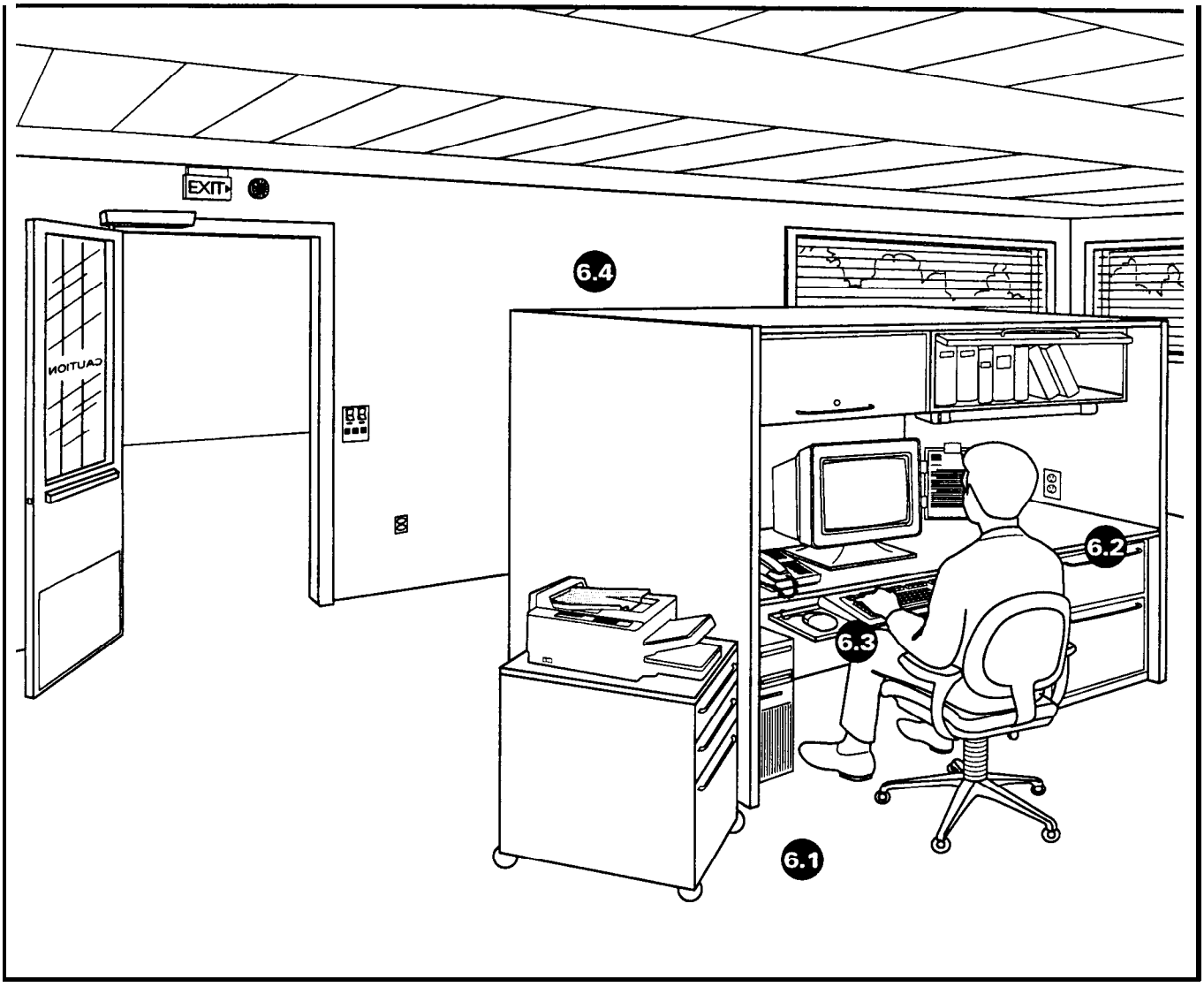
use a chair with padded armrests 9-12" long and at least 2" wide, adjustable 7-10" above the seat; if not, add padded forearm rests to work surface 7-10" above seat height

adjust the armrest height so that your elbows rest lightly on the armrests with your upper arms straight up and down and your forearms horizontal or slightly downward

5.4 To make sure the backrest supports your back...

use a chair with a height-adjustable backrest that also adjusts to lean both forward and backward; if not, use a cushion for forward-leaning posture

use a chair with a backrest including a lumbar support that is l-2" thick, 13" wide and 6-9" top to bottom and located 9-10" above the seat; if not, use a firm pillow or pad secured to backrest



6. Is your work space adequate for you and your work tasks?

6.1 Is there enough space for your tasks and materials? Yes No

6.2 Can you adjust the height and angle of your work surface? Yes No

6.3 Is there enough space for your legs under your work surface? Yes No

6.4 Is the air quality good in your work space? Yes No

The Work Space

6. Is your work space adequate for you and your work tasks?

6.1 To make sure there is adequate space for your tasks and materials...

allow at least 48" aisle width between work stations; provide approach space at least 30" wide by 48" deep

provide at least 10" of clearance from work surface to underside of shelves and cabinets

provide nearby storage for materials not immediately needed

6.2 To make sure the work surface can be adjusted to suit your work...

provide for adjustment of surface angle: O-20 degrees

provide for adjustment of surface height: 25-34" for seated work, 33-45" for standing work (precision work requires higher work surfaces, heavy work requires lower work surfaces; elbows should not need to be raised above mid-torso)

if work surface does not have built-in adjustment for height and angle, modify supports or replace with supports of appropriate size or adjustable supports

6.3 To make sure there is enough space for your legs (after adjusting the height of your chair to fit you)...

provide knee well at least 30" wide by 19" deep; provide anti-fatigue mats and foot stools at standing work stations

limit work surface depth to 38" maximum

limit work surface thickness to 2" maximum; round all edges and corners

provide 10 1/2" - 12" clearance between the chair seat surface and the underside of your work surface

6.4 To control the air quality of your work space...

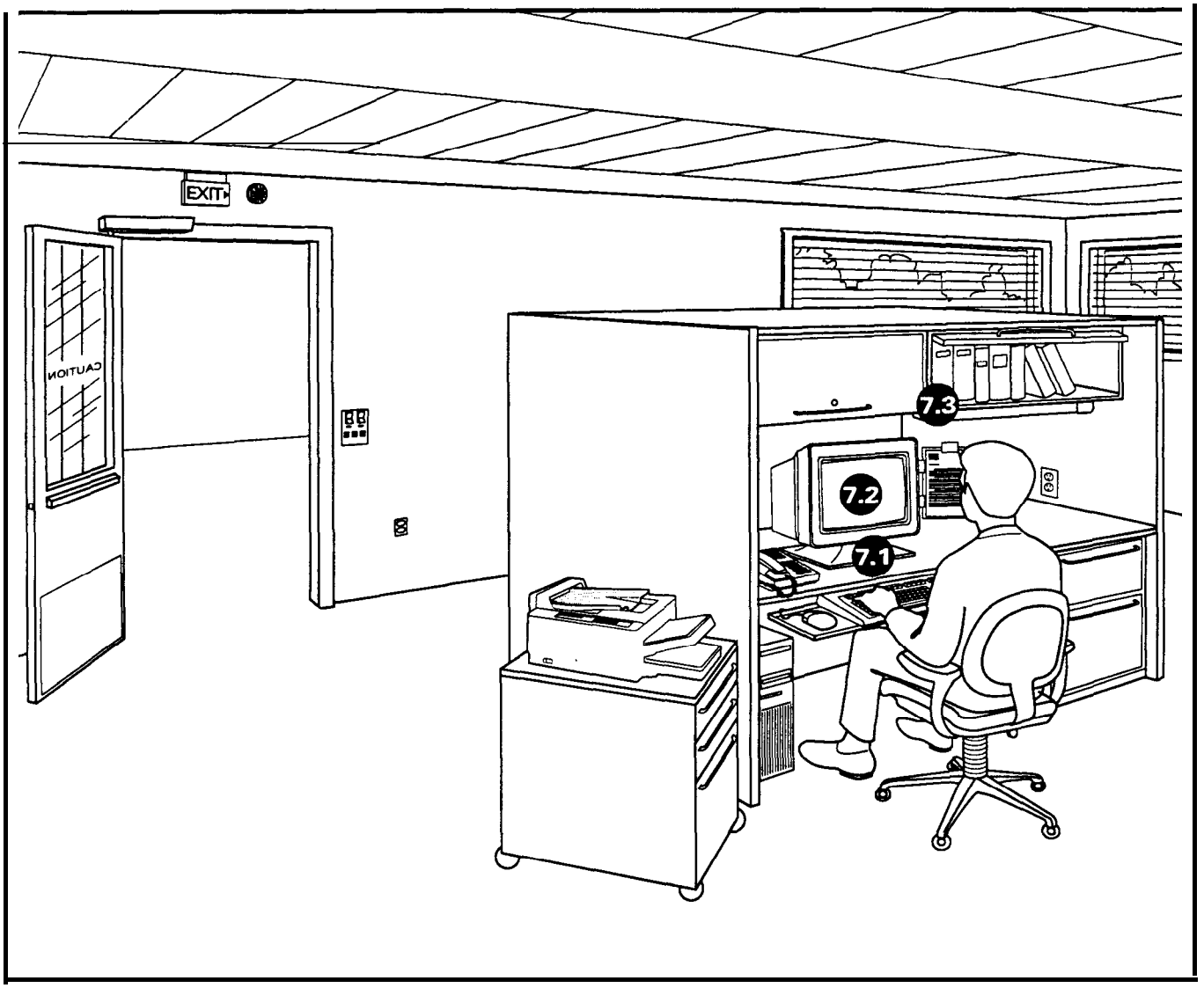
provide thermostat or adjustable air vents for temperature control

maintain humidity at 40-70% through building system or use portable humidifier or dehumidifier

provide access to fresh air; service building system filters regularly; use local air purifiers, and/or position workstation near window that can be opened

position your work station away from drafts or extremes of heat or cold; use portable fans or heaters if necessary

keep direct heat sources at least 48" away from work station; provide adequate ventilation for computer monitor and processing unit



7. Is your computer display easy to use?

7.1 Is the monitor directly in front of you? - Yes No

7.2 Can you use the computer without being distracted by glare from the screen? __Yes__No

7.3 Are your source documents as close as possible to the monitor screen? - Yes No

Computer Displays

7. Is the computer display easy to use?

7.1 To place the monitor at your center of vision...

place the monitor on a solid, stable surface directly in front of your chair, directly over the center of the kneewell of your work station

support the monitor so that the top edge of the screen is at your eye level (lower if you use bifocals)

place the monitor so that your eyes are at least an arm's length from the screen (approximately 18-28")

avoid using a "notebook" computer for prolonged periods

7.2 To eliminate glare from the screen...

orient the screen perpendicular to windows and parallel to rows of lighting fixtures; if needed, add louvers or diffusers to lighting fixtures and coverings to windows

to position the screen, place a small mirror on the center of the screen and pivot the monitor until you can see your eyes

adjust the display brightness and contrast and use display colors with equal brightness; avoid extreme reds and blues

switch the monitor to dark-on-light display

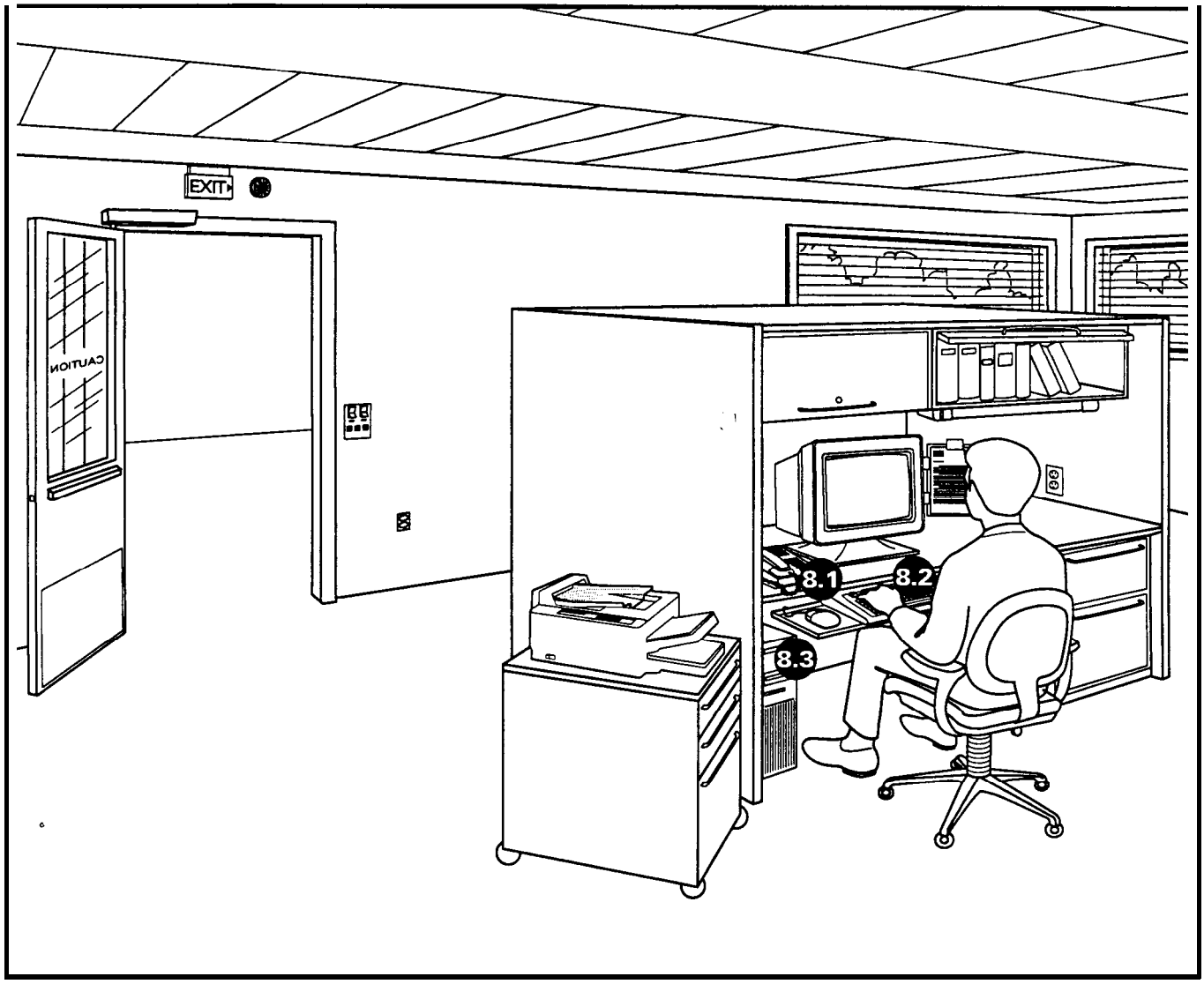
keep the monitor screen clean

add side shields or high-quality anti-glare screen if necessary

7.3 To locate your source documents as close as possible to the monitor screen...

clip a document holder to the right or left side of the monitor or provide a height-adjustable document stand

to adjust the document holder, place a small mirror on the center of the document holder and position it so that you can see your eyes



8. Are you comfortable using your keyboard and mouse?

8.1 Are both your keyboard and mouse within easy reach? Yes No

8.2 Are both your keyboard and mouse on a firm, stable surface? Yes No

8.3 Do you use software shortcuts like macros and style sheets? Yes No

Computer Keyboard and Mouse

8. Are you comfortable using your keyboard and mouse?

8.1 To locate your keyboard and mouse within easy reach...

place the keyboard and mouse together on a platform at least 28" wide, directly in front of you and directly beneath the monitor; provide adequate cabling to allow right or left mouse positioning

install a padded, removable wrist and palm support as close as possible to keyboard and mouse

8.2 To avoid input errors and excessive keystroke force due to unstable platform...

if the keyboard/mouse platform is movable, it must be easy to pull out, push back, and lock securely into place

height of the keyboard/mouse platform should allow your hands to rest lightly on keyboard or mouse with your forearms on the chair armrests (after you have adjusted your chair)

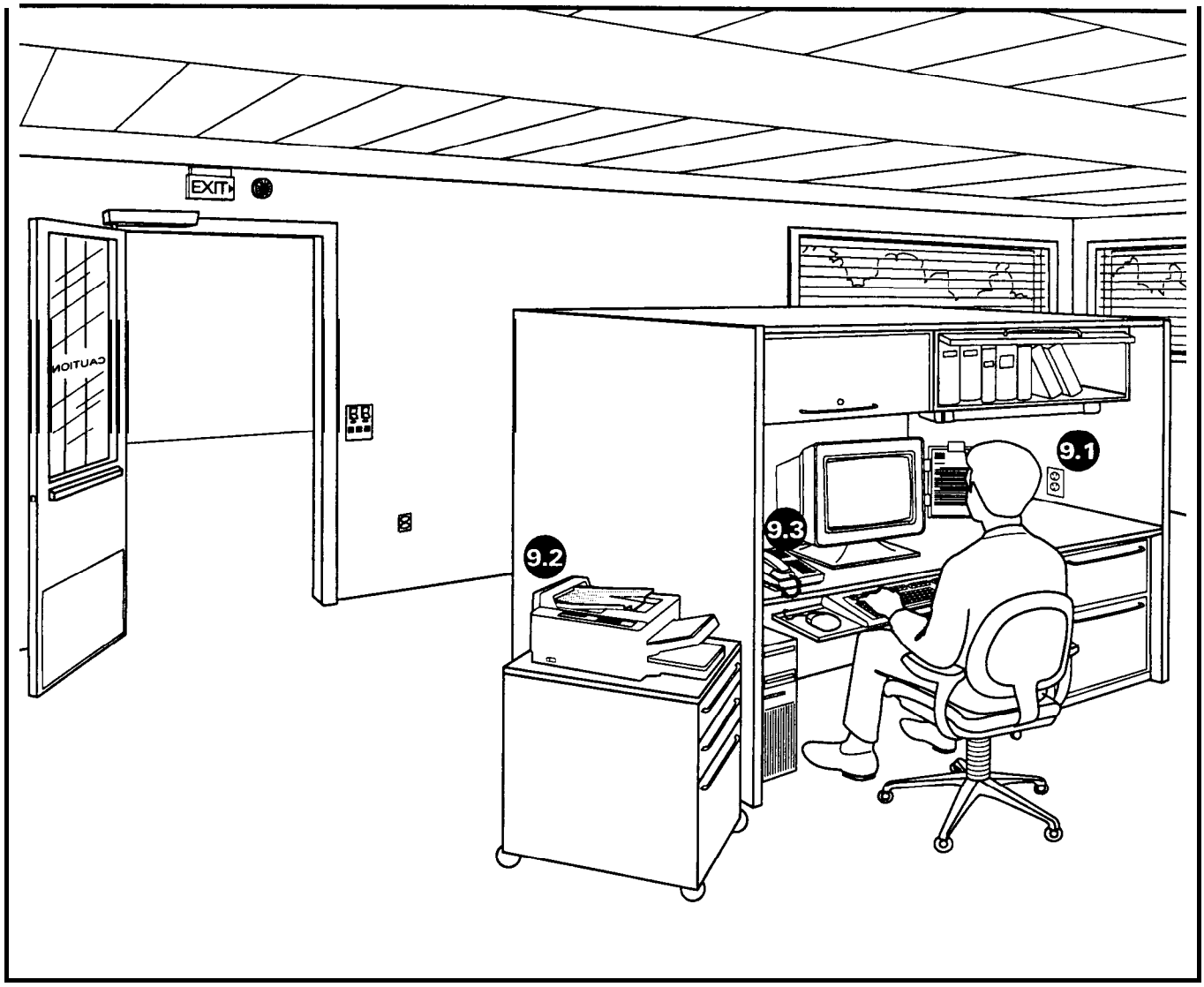
avoid using a "notebook" computer for prolonged periods

8.3 To take advantage of effort-saving software...

alternate the use of keystroke equivalents for mouse movements

use adjustments for key input delay and key repeat

use macros and style sheets wherever possible



9. Can you use your telephone and other office equipment comfortably?

9.1 Are there electrical outlets in convenient locations for your equipment? - Yes No

9.2 Are the equipment controls easy to use? - Yes No

9.3 Are you comfortable when using the telephone? - Yes No

Telephones and Other Office Equipment

9. Can you use office equipment comfortably?

9.1 To make sure electrical outlets are adequate and reachable...

provide outlets near electrical equipment, no lower than 15" above floor, or provide extension cords or outlet strips where needed

where outlets are within reach, use ground-fault interrupter (GFI) outlets

9.2 To make equipment controls easier to use...

place clear, simple labels or instructions next to controls

contrast color, brightness, and texture of controls with background; add bright and/or tactile labels if needed

if knobs are difficult to twist, add non-slip tape or replace with levers (ideally, all controls should be operable with a closed fist)

provide adequate lighting (without glare) on controls

locate equipment at a height and angle that allows operation with minimal bending, flexing, or twisting of arms, wrists, or hands

mix, automate, or change task sequence to minimize repetitive movements

allow maneuvering space or movement of the equipment to allow right- or left-hand operation

9.3 To make telephones more comfortable to use...

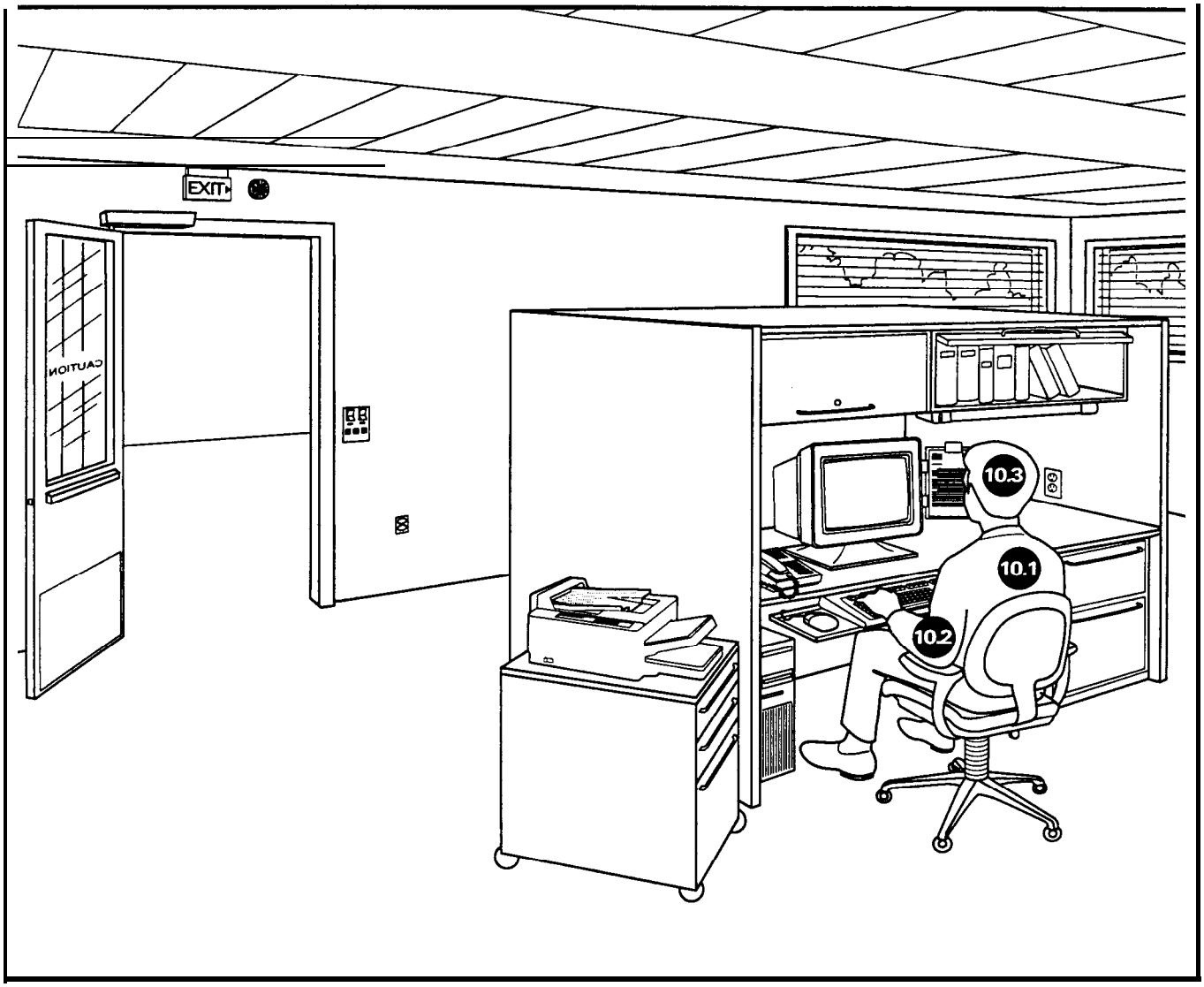
wall-mounted phones should be no higher than 48" above the floor, with room for a wheelchair to approach (30" x 48" clear space), and protrude into path of travel no more than 4"

allow sufficient cabling for desktop phone placement on the right or left side

desktop phones should be reachable without leaning and should be located opposite your dominant hand to allow writing while on the phone without cradling the handset between your neck and shoulder; if suitable for tasks and work area, use a speakerphone

if headset is used, use lightest possible headset with adequate cabling for free movement without entanglement, or use wireless headset; locate desk unit-to allow alternating between use of handset and headset

if text telephone (TTY) is provided, post International TTY Symbol



10. Are you free of excessive fatigue-and pain at the end of your work shift?

10.1 Do you maintain as neutral a work posture as possible? - Yes No

10.2 Do you avoid repetitive and cumulative stresses? - Yes No

10.3 Do you take care of your health? - Yes No

Work Practices

IO. Are you free of excessive fatigue and pain at the end of your work shift?

10.1 To maintain as neutral a posture as possible...

sit in a comfortable upright position with feet flat on the floor, thighs fully supported by the chair seat, with no pressure on back of knee area

adjust the chair armrests so that your upper arms are parallel with your upper body, your lower arms are level, your shoulders neither slumped nor hunched, and your elbows are close to your sides

adjust the chair backrest so that the lumbar support contacts the hollow of your back, and you can lean forward or backward with moderate resistance

check the knee clearance: if too low, raise the work surface or remove center drawer; if too high, modify work the surface supports or raise your chair and add a footrest equal to the additional height; remove any obstructions to free movement of your legs

check the work surface height: your hands should rest on the keyboard or work surface with your forearms on armrests and your wrists in a neutral (relaxed, not bent) posture

locate the monitor directly behind the keyboard and mouse, with the top of the monitor at your eye level about arm's length away; to adjust the angle, place a small mirror on the center of the screen and tilt the monitor until you can see your eyes

position your work, equipment and materials directly in front of you; locate the keyboard and mouse close together on same surface, which should not move when the keyboard is used; use a light touch on keyboard

10.2 To minimize repetitive and cumulative stresses...

readjust your chair to suit your individual tasks and to give muscle groups a break

alternate tasks throughout the work shift (example: stop using keyboard, lean back and proofread your work, retrieve work from printer, messages from fax machine, etc.)

wherever possible distribute or alternate tasks between right and left hands; alternate between use of keyboard and mouse (use keystroke equivalents to mouse)

avoid prolonged use of a "notebook" computer; minimize "recreational" computer use

take regular breaks for simple, brief exercises (examples: shoulder shrugs, neck rolls, ankle rotations, leg extensions, overhead stretches, hand shakes, finger spreads)

every 20 minutes, refocus your eyes from the computer screen to an outside window or other object at least 25 feet away

10.3 To maintain your health...

have regular general medical and eye examinations as recommended by a physician

get adequate rest, regular exercise and maintain a healthy diet